

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Samuel C. Weaver)	
)	METAL MATRIX
Serial No. 09/838,866)	COMPOSITE HORSESHOE
)	
Filed: April 20, 2001)	
)	
Art Unit: 3643)	
)	
Patent Examiner: Nguyen, Son T.)	
)	
Our Ref: 01-211)	
)	
Customer No. 30058)	
_____)	

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August 23, 2006

**APPLICANT'S REQUEST TO MAINTAIN APPEAL AND SUPPORTING REPLY
BRIEF TO SUPPLEMENTAL EXAMINER'S ANSWER DATED AUGUST 10, 2006**

Pursuant to 37 CFR §41.50(a)(ii) Applicant requests that the Appeal be maintained and, in support thereof, submits this Reply Brief.

This appeal is to decide whether, considering Eom¹ in view of Weaver '607², the invention of Claims 1-14 was obvious to one of ordinary skill in the art at the time that the invention was made.

Applicant agrees with the "Status of Claims" as expressed in the Supplemental Examiner's Answer dated August 10, 2006 (herein "Ex. Ans. III"). Specifically, Claims 15 and

¹ U.S. Patent No. 5,344,607 to Eom et al.

² U.S. Patent No. 5,573,607 to Weaver.

16 have been withdrawn and the remaining claims (Claims 1-14) are presented for consideration in this Appeal.

The claimed invention is a “horseshoe” that has “improved vibration damping and stiffness”. The horseshoe is made of a composition that is selected from the field of “metal matrix composites”. The selected metal matrix composite is composed of a metal selected from the group of aluminum, magnesium, titanium and mixtures thereof and silicon boride selected from the group of silicon hexaboride and silicon tetraboride and mixtures thereof. (Appl. Pg. 2, lines 4-7, 13 and 14; and Weaver (incorporated by reference, pg. 2, lines 14, 15) Col. 1, lines 10-14; Col. 2, lines 1-6; Col. 2, lines 24-25; Col. 2, lines 53-56; Col. 2, line 65 – Col. 3, line 3; Col. 3, lines 14-18).

The Examiner must show, by a preponderance of the evidence of record, that it is more probable than not that the claimed invention is unpatentably obvious over Eom in view of Weaver '607. *In re Eli Lilly & Co.*, 902 F.2d 943 (Fed. Cir. 1990); *In re Oetiker*, 977 F.2d 1443 (Fed. Cir. 1992). The Supplemental Examiner's Answer dated August 10, 2006 ("Ex Ans. III") merely reaffirms that the Examiner's positions are contrary to the facts of record in this appeal and that the claimed invention is patentable over Eom in view of Weaver '607.

Examiner's Answer Dated August 10, 2006

The Supplemental Examiner's Answer dated August 10, 2006 ("Ex. Ans. III") repeats and re-alleges some of the same contentions as the Examiner's Answers dated October 7, 2004 (herein "Ex. Ans. I") and April 5, 2006 (herein "Ex Ans. II"). The Applicant previously responded to Ex. Ans. I and Ex. Ans. II in Applicant's Reply Briefs dated November 12, 2004 and June 6, 2006. To the extent that Ex Ans. III repeats and re-alleges the contentions of Ex.

Ans. I and/or Ex. Ans. II, Applicant hereby incorporates by reference Applicant's Reply Briefs dated November 12, 2004 (attached as Exhibit A) and dated June 6, 2005 (attached as Exhibit B) and repeats and re-alleges all of the statements and arguments thereof as if fully set forth herein.

In addition, Applicant further states that Ex. Ans. III confirms that the rejection of the claims is grounded in fundamental error and finds no support in the record on appeal.

Additional Remarks

Ex. Ans. III is founded on a misconstruction of the plain meaning of the words that describe and claim the Applicant's invention. In the claims and throughout the specification, the Applicant describes the invention as a "horseshoe" that is made from a "metal matrix composite". The specification describes that the "metal matrix composite" is formed from (i) a molten metal selected from the group consisting of aluminum, magnesium, titanium and mixtures thereof and (ii) particles of silicon boride composition selected from the group consisting of silicon tetraboride, silicon hexaboride and mixtures thereof. (See Application, p. 2, lines 4-7; pg. 2, line 29 - pg. 3, line 10). Claim 1 includes the same components.

Ex. Ans. III quarrels that Eom discloses "a metal alloy selected from aluminum, magnesium and titanium and mixtures thereof" and that such composition is a "metal matrix composite" as described in the subject application. This is completely contrary to the Application.

There is simply no support for Ex Ans. III's contention that the Application describes a "metal matrix composite" as being only "molten metal selected from of (sic) aluminum, magnesium, titanium and mixtures thereof." The Applicant has described and claimed a "metal matrix composite" that has a metal component and a silicon boride component. Eom teaches a

metal alloy, not a metal matrix composite. As essential as it may be to the Examiner's argument, "metal alloys" are not "metal matrix composites" and the Applicant does not describe or claim that "metal matrix composites" are "metal alloys."

The Examiner concedes that the metal alloy of EOM does not even have silicon boride! (Ex. Ans. III, pg. 7, lines 17-18). The Examiner seeks to sustain the rejection of Claims 1-14 on the argument that EOM (which does not teach silicon boride) can be modified by a teaching that a metal matrix composite is "stronger" so that EOM can be modified to be made stronger! (Ex. Ans. III, pg. 4, lines 1-5). The Official Action relies on no combination of Weaver with EOM except for the teaching of silicon boride to make EOM "stronger". (Ex. Ans. III, pg. 4, lines 1-5). Since the Official Action concedes that EOM does not have silicon boride, the Official Action speculates that the proposed combination (somehow) causes EOM to be "stronger."

The claim terms are to be construed according to their meaning as understood by one of ordinary skill in the art. *Texas Digital Systems, Inc. v. Telegenix, Inc.*, 308 F.3d 1193, 64 U.S.P.Q.2d 1812 (Fed. Cir. 2002). The record clearly establishes that those of ordinary skill in the art knew a "metal matrix composite" to be a metallic matrix in combination with a physical reinforcing constituent. In contrast, in metal alloys, the alloy's atoms combine with the parent metal's crystal lattice. Weaver II Decl. ¶¶ 8-18³, Response to Official Action, pp. 2, 3⁴, Introduction to Metal Matrix Composites⁵, The Structure of Metal, pp. 1-3⁶, and Appeal Brief dated November 12, 2004, p. 8. Thus, those skilled in the art distinguish "metal alloys" wherein

³ Declaration of Samuel C. Weaver dated August 21, 2003 (herein cited as "Weaver II Decl. ") (See Exhibit C).

⁴ Applicant's Response to Official Action dated August 22, 2003.

⁵ "An Introduction to Metal Matrix Composites," T.W. Clyne and P.J. Withers, pp. 1-70, Cambridge University Press, 1993.

⁶ "The Structure of Metal," Bob Capudean, The Fabricator.com, April 24, 2003.

the alloy and the parent metal combine at the atomic level from "metal matrix composites" wherein a reinforcing constituent does not combine with the metal matrix at the atomic level.

Ex. Ans. III does not even contend that Eom discloses a "metal matrix composite"! Ex. Ans. III admits that it merely uses "metal alloy" interchangeably with "metal matrix composite"! (Ex. Ans. III, pg. 4, lines 12-13). The Examiner offers only conjecture that, contrary to the record, "metal matrix composites" are the same as "metal alloys". Nothing in the application or any of the references suggests such an equivalency. On the contrary, the application and references clearly demonstrate that those terms have very different meanings and are not interchangeable!

In an attempt to redefine "metal matrix composite", the Examiner asserts that the meaning of "metal matrix composite" is "unclear". Purporting to rely on the specification, the Examiner then "finds that the definition of a metal matrix composite is simply a material that is formed by a molten metal selected from aluminum, magnesium, titanium and mixtures thereof." (Ex. Ans. III, pg. 5, lines 1-3).⁷ Ex. Ans. III does not cite any language of the specification which is said to support that critical "finding." It is certainly not found in Claim 1 or on pages 2 or 3 of the specification! On the contrary, the specification clearly explains that the selected metal matrix composite is composed of a metal selected from the group of aluminum, magnesium, titanium and mixtures thereof and silicon boride selected from the group of silicon hexaboride and silicon tetraboride and mixtures thereof.

Ex. Ans. III concedes that the metal alloy of Eom does not have silicon boride! (Ex. Ans. III, pg. 7, lines 15-18) The Examiner still insists that, somehow, it would be obvious to modify

⁷ The Examiner offers no explanation as to how the meaning of "metal matrix composite" is "unclear". On the contrary, Ex. Ans. II admits that the specification defines "metal matrix composite" as "molten metal selected from the group consisting of aluminum, magnesium, titanium and mixtures thereof.... Then silicon boride is added to create this metal matrix composite horseshoe...." (Ex. Ans. II, pg. 3, lines 16-19)

the metal alloy of Eom in light of the metal matrix composite that is taught in Weaver '607 to arrive at a metal alloy. However, Ex. Ans. III does not explain how that combination is expected to transform Eom into a metal matrix composite.

It is well settled that when making a rejection under 35 U.S.C. Sect. 103, the Examiner has the burden of establishing prima facie case of obviousness. MPEP sect. 2142. The Examiner can satisfy this burden only by showing an objective teaching in the prior art, or that knowledge generally available to one of ordinary skill in the art would lead the individual to combine the relevant teachings of the references in the manner suggested by the Examiner. *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988); MPEP Sect. 2143.01. Obviousness cannot be established by combing the teachings of the prior art to produce the claimed invention absent some teaching, suggestion or incentive supporting the combination. *In re Geiger*, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987).

Even if Eom were to be transformed into a metal matrix composite, there is nothing in either Eom or Weaver '607 to suggest their combination. The Examiner refers to a teaching in Weaver '607 that metal matrix composites are "stronger" than the counterpart pure metals. (Ex. Ans. III, pg. 7, lines 15-19). However, the claimed horseshoe does not specify material "strength". It requires "improved vibration damping and stiffness". Nothing in the subject application or any of the references equates material "strength" with "vibration damping and stiffness". Material strength is not the same as "vibration damping and stiffness." Accordingly, a teaching in Weaver '607 as to material "strength" offers no support for the Examiner's contention that the cited references would cause one skilled in the art to combine Eom and Weaver '607 to improve "vibration damping and stiffness". Weaver I Decl. ¶¶ 13-18.⁸

⁸ Declaration of Samuel C. Weaver dated January 13, 2003 (herein cited as Weaver I Decl.) (See Exhibit D).

Ex. Ans. III also attempts to create obviousness by confusing abrasion resistance with stiffness. Ex. Ans. III extrapolates from a statement in Eom to say that "'abrasion resistance' would be for stiffness because if not stiff, abrasion would occur." (Ex. Ans. III, pg. 8, lines 1-3). This is nothing more than speculation. It is not supported by any teaching of Eom. The Examiner's mischaracterization of Eom cannot change the fact that Eom has no teaching that the horseshoe requires both "stiffness" and "vibration damping" as required by the subject claims.

The claims require a "horseshoe" that has "improved vibration damping and stiffness". The record of this application is that those skilled in the art would not recognize the property of "vibration damping and stiffness" as being found in the metal matrix composite of Weaver '607. Weaver I Decl. ¶¶ 13-18; and Weaver II Decl. ¶¶ 11-15, 19. That fact is uncontroverted. The "vibration damping and stiffness" in the composite described in Weaver '607 was unknown to those skilled in the art. Weaver I Decl. ¶¶ 9, 11, 13-16, 18 and 19; and Weaver II Decl. ¶¶ 9, 11, 15 and 19. It was surprising to the inventor of Weaver '607 when he later discovered this property! (Weaver I Decl. ¶¶ 13-19; and Weaver II Decl. ¶¶ 11-19). Accordingly, it cannot be properly said that it would be obvious to combine the Eom and Weaver '607 references to secure a material property that was not known from either reference.

The Examiner appears to argue that the properties of "stiffness" and "vibration damping" were not unexpected because they were inherent in Weaver '607. (Ex. Ans. III, pg. 6, line 19 - pg. 7, line 3). The Examiner quarrels that merely because Weaver '607 does not teach that the metal matrix composite has both stiffness and vibration damping, that does not mean that it does not exist in the material. This argument is inapposite and completely misses the point of the claimed invention. The constancy of material properties is not an issue for decision and is not a proper basis for denying patentability of the subject claims. The reason for rejection and the sole

issue for decision is whether the claimed invention, a horseshoe, is obvious in light of Eom and Weaver '607 as known at the time that the invention was made.

This can be stated as: "Given the knowledge at the time of the invention, would it have been obvious for one skilled in the art to have made the various combinations that the Examiner now proposes?" The answer is "no" because the material in Weaver '607 was not known to have "stiffness" and "vibration damping". (Weaver I Decl. ¶¶ 15-19; and Weaver II Decl. ¶¶ 15-18). It is beyond cavil that Weaver '607 does not teach both stiffness and vibration damping and that those parameters were not known to those skilled in the art at the time of the invention. The declaration of the inventor of Weaver '607 so states. (Weaver I Decl. ¶ 18; and Weaver II Decl. ¶ 18). Under those circumstances, it could not have been obvious for one to use the material in Weaver '607 to make a combination with Eom that was intended to result in a horseshoe having "stiffness" and "vibration damping." Other than the Applicant's own teachings, there is simply no basis to support such a combination.

According to the Examiner's argument, Edison's light bulb was unpatentably obvious because the filament had the same properties before and after Edison's invention of the light bulb. However, Edison did not invent the filament material - he invented the light bulb. The test for obviousness was: "When the critical properties of the filament are unknown, would it have been obvious for one skilled in the art to select that material as a filament?"

Similarly, the question here is: "Would one have obviously selected the material described in Weaver '607 to make a "horseshoe" having "improved vibration damping and stiffness" without knowing that the material properties afforded "improved vibration damping and stiffness"? Of course, such a selection was not obvious and the Examiner's proposed combination is argued to be obvious only in hindsight of the Applicant's own teachings. Ex.

Ans. III offers no precedent or authoritative support for its theory that it somehow becomes obvious to combine references by relying on properties of a material when those properties are not known to exist prior to the time of the purported combination.

Ex Ans. III speculates that the metal alloy of EOM can be made "stronger" but does not explain how that result is achieved. Ex. Ans. III specifically denies that it is done by substituting the metal matrix composite of Weaver '607 for any metal alloy. The sum of the Examiner's contentions seems to be that since Eom teaches making horseshoes of metal and Weaver '607 teaches that certain metal matrix composites are stronger than the constituent metal, it somehow becomes obvious to combine the references - notwithstanding that material strength is not claimed for the Applicant's horseshoe and that the properties of the claimed horseshoe are unknown in the metal matrix composite.

Neither Eom nor Weaver '607 describe or suggest that the combination would produce a horseshoe with "improved vibration damping and stiffness". That distinction is only learned from the subject application. Therefore, there is no motivation to combine EOM with Weaver '607.

The Examiner concedes reliance on hindsight reasoning. (Ex. Ans. III, pg. 6, lines 8-11). It is argued that this "takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made". (Ex Ans. III, pg. 6, lines 11-14). However, the contention that one skilled in the art was aware that the Weaver '607 metal matrix composite exhibited both "stiffness" and "vibration damping" is not supported by Weaver '607, Eom or any other reference. To the contrary, the Weaver Declarations state exactly the opposite! The Weaver Declarations make clear that it was not known that the Weaver '607 metal matrix composite exhibited both stiffness and vibration damping! (Weaver I Decl. ¶¶ 8, 9, 11, 15-18;

and Weaver II Decl. ¶¶ 9, 11, 14-19.) The Examiner does not cite any reference for that information because that information is found only in the Applicant's disclosure.

Conclusion

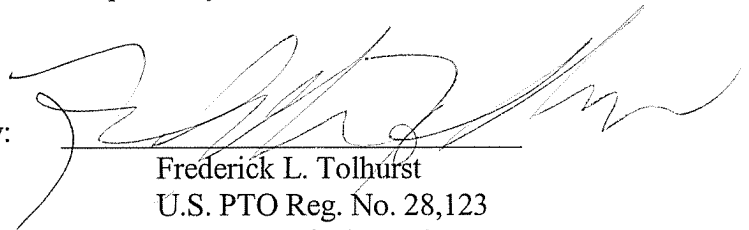
Ex. Ans. III concedes that the Examiner draws no distinction between metal matrix composites and metal alloys. Although the Examiner makes no such distinction, the record of this application amply demonstrates that the differences are well known to those skilled in the art. The rejection of the claims is improper because it is based on combining a refusal to acknowledge distinctions in the art that have been specifically documented in the record with knowledge that is found only in the Applicant's own teachings. Accordingly, allowance of Claims 1-14 is respectfully requested.

The Commissioner is hereby authorized to charge any fees, credit any overpayments or charge any additional fees associated with this filing to Deposit Account No. 03-2026.

The Commissioner is hereby authorized to charge and/or credit the aforementioned deposit account for any overpayments or deficiencies in the above calculated fees or those required under 37 C.F.R. §§ 1.16 or 1.17 and any extension fees under 37 C.F.R. § 1.136(a).

Respectfully submitted,

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Exhibit A

Applicant's Reply Brief dated November 12, 2004

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Samuel C. Weaver

Serial No. 09/838,866

Filed: April 20, 2001

Art Unit: 3643

Patent Examiner: Nguyen, Son T.

Our Ref: 01-211

Customer No. 30058

METAL MATRIX COMPOSITE HORSESHOE

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November 12, 2004

APPLICANT'S REPLY BRIEF

This appeal is to decide whether the claimed invention would be obvious to one of ordinary skill in the art considering Eom in view of Weaver. The determination of patentability is to be based on a preponderance of evidence when considering the entire record. *In re Oetiker*, 977 F.2d 1443 (Fed. Cir. 1992). With regard to rejections under 35 U.S.C. §103, the Examiner must provide evidence which as a whole shows that the legal determination sought to be proved is more probable than not. *In re Eli Lilly & Co.*, 902 F.2d 943 (Fed. Cir. 1990). In contrast to meeting this standard, the Examiner's Answer merely serves to underscore that the claimed invention is patentable over Eom in view of Weaver.

The claimed invention requires a “metal matrix composite horseshoe” that has “improved vibration damping and stiffness”. The meaning of the term "metal matrix composite" as used throughout the application is clear. The application teaches and claims that the metal matrix composite is: (1) a metal in combination with (2) a silicon boride. The metal is selected from the group of aluminum, magnesium, titanium and mixtures thereof. The silicon boride is selected from the group of silicon hexaboride and silicon tetraboride and mixtures thereof. (Appl. Pg. 2, lines 4-7, 13 and 14; and Weaver (incorporated by reference, pg. 2, lines 14, 15) Col. 1, lines 10-14; Col. 2, lines 1-6; Col. 2, lines 24-25; Col. 2, lines 53-56; Col. 2, line 65 – Col. 3, line 3; Col. 3, lines 14-18).

Examiner's Misconstruction of the Claimed Invention

The Examiner's Answer demonstrates that the rejection of the claims in this case is based on a fundamental misconstruction of the plain meaning of the words that describe and claim the Applicant's invention. In the claims and throughout the specification, the Applicant describes the invention as a horseshoe that is made from a "metal matrix composite". To support the rejection under §103, the Examiner conjectures that "metal matrix composites" are the same as "metal alloys". Indeed, the Examiner admits that she uses "metal alloy" interchangeably with "metal matrix composites". (Examiner's Answer, pg. 3, lines 12-13). However, nothing in the application or any of the references suggests such an equivalency. On the contrary, the file history clearly demonstrates that those terms have very different meanings and are not interchangeable!

The application consistently describes the material of the claimed horseshoe as a "metal matrix composite." The term "metal matrix composite" is used in the specification and claims 13 times. The application never describes the material of the claimed horseshoe as a pure metal or as a metal alloy. As known to those of ordinary skill in the art, a "metal matrix composite" is a metallic matrix in combination with a physical reinforcing constituent. In contrast, in metal alloys, the alloy's atoms combine with the parent metal's crystal lattice. Weaver Decl. ¶¶ 8-18¹, Response to Official Action, pp. 2, 3², Introduction to Metal Matrix Composites³, The Structure of Metal, pp. 1-3⁴, and Appeal Brief, p. 8. Thus, those skilled in the art recognize that in metal alloys the alloy and the parent metal combine at the atomic level whereas in metal matrix composites, the reinforcing constituent does not combine with the metal matrix at the atomic level.

In opposition to this body of information, the Examiner offers an unsupported assertion that "metal matrix composite" is defined as a "material that is formed by a molten metal selected from aluminum, magnesium, titanium and mixtures thereof". She claims to rely on the specification for this conclusion. (Examiner's Answer, pg. 4, lines 1-4). This is plain error. The Application defines the "metal matrix composite" as the combination of (1) a metal selected from the group of aluminum, magnesium, titanium and mixtures thereof with (2) silicon boride selected from the group of silicon hexaboride and silicon tetraboride. (Appl. Pg. 2, lines 4-7, 13 and 14; and Weaver (incorporated by reference, pg. 2, lines 14, 15) Col. 1, lines 10-14; Col. 2,

¹ Declaration of Samuel C. Weaver dated August 21, 2003 (herein cited as "Weaver Decl. ¶ ____").

² Applicant's Response to Official Action dated August 22, 2003.

³ "An Introduction to Metal Matrix Composites," T.W. Clyne and P.J. Withers, pp. 1-70, Cambridge University Press, 1993.

⁴ "The Structure of Metal," Bob Capudean, The Fabricator.com, April 24, 2003.

lines 1-6; Col. 2, lines 24-25; Col. 2, lines 53-56; Col. 2, line 65 – Col. 3, line 3; Col. 3, lines 14-18).

The application's use of "metal matrix composite" is totally consistent with the meaning of that term as used in the art. The Examiner's statement is directly opposed to the use of that term as it is understood in the art. It has no support in the record and is without merit. The argument that the term "metal alloy" is interchangeable with "metal matrix composite" is not based on any reasonable construction of any language in the application or the file history and is contrary to information generally known to those skilled in the art. The Examiner's Answer does not (and cannot) cite any portion of the application to support such a contention.

In addition to the fact that the Examiner's equivalency of "metal matrix composite" with "metal alloy" is contrary to the application, the Examiner's position also ignores Weaver's Declaration, the Response to Official Action, the reference entitled "Introduction to Metal Matrix Composites" and the reference entitled "The Structure of Metal". All of those documents explain that it was known in the art that "metal matrix composites" are different than "metal alloys".

The decision on patentability must be made upon consideration of all the evidence, including the evidence submitted by the Applicant. *In re Eli Lilly & Co.*, 902 F.2d 943 (Fed. Cir. 1990). In *In re McLaughlin*, 443 F.2d 1392 (CCPA 1971) (cited in Examiner's Answer), the CCPA reversed the Board and allowed a claim for which the Applicant had submitted a supporting affidavit. The Court found that it is "imperative" that such affidavits be evaluated in determining whether the claimed invention was unpatentable under §103. *McLaughlin @* 1395. However, instead of citing the record in this Appeal, the Examiner mischaracterizes the specification and ignores the remainder of a file history that further explains that metal matrix

composites are not metals and are not metal alloys. (Weaver Decl. ¶11, The Structure of Metal; and An Introduction to Metal Matrix Composites).

Examiner's Combination of Eom and Weaver Fails to Produce the Claimed Invention

The Examiner's proposed combination of references relies principally on the metal alloy of Eom. (Examiner's Answer, pg. 3, lines 19-22). Eom describes a horseshoe that is made of an Al-Mg alloy. Eom selected that alloy because it is said to be ductile and shock absorbing. To make the horseshoe more abrasion resistant, Eom limits Mg content and adds Zn. (Eom, Col. 2, line 16-21). Eom describes the horseshoe as an "alloy" or "alloy metal" fourteen times. Never once does Eom indicate that the horseshoe could be a "metal matrix composite" material.

The Examiner proposes to add to Eom's metal alloy the further ingredient of silicon boride. (Examiner's Answer, pg. 4, lines 10-14). Weaver is cited as teaching that silicon boride can be added to molten metal. (Examiner's Answer, pg. 4, lines 6-9). Eom does not describe or suggest the use of a metal matrix composite. Eom is directed to a horseshoe that is made of a metal alloy. Thus, the Examiner proposes to combine Eom and Weaver so as to produce a horseshoe made of a metal alloy that includes silicon boride.

However, Claim 1 does not require a metal alloy. Claim 1 requires a metal matrix composite which, as explained extensively in the file history of this application, is not a metal alloy. (Appeal Brief, pg. 8; Response to Official Action, pp. 2-3, Introduction to Metal Matrix Composites; The Structure of Metal; and Weaver Decl. ¶¶ 10, 11). Therefore, even if Eom and Weaver could be properly combined as the Examiner proposes, that combination yields a metal

alloy and not a metal matrix composite. Thus, the Examiner's combination of Eom and Weaver does not produce the claimed invention!

The Combination of Eom and Weaver is Improper

To prevent hindsight reconstruction of various elements that might exist, the Federal Circuit requires rigorous application of the tests regarding whether references should be combined. Thus, the law requires the existence of some teaching, suggestion, reason or motivation to combine prior art references. *McGinley v. Franklin Sports, Inc.* 262 F.3d 1339 (Fed. Cir. 2001). The mere level of skill in the art cannot be relied upon to provide the suggestion to combine references. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308 (Fed. Cir. 1999).

The Examiner admits that she relied on hindsight reasoning in rejecting the claims. (Examiner's Answer, pg. 6, lines 10-13). Still, she argues that one of ordinary skill in the art would have been led to modify Eom by adding silicon boride material according to Weaver for the purpose of making the horseshoe "stronger". (Examiner's Answer, pg. 4, lines 7-14). Claim 1 requires a horseshoe having improved properties of "vibration damping and "stiffness". The Examiner's argument for a motivation to combine Eom and Weaver necessarily (but incorrectly) equates properties of "vibration damping" and "stiffness" with the property of "strength".

"Vibration damping" and "stiffness" of a material are not the same properties as "strength" of a material. The Examiner offers nothing to support the notion that those properties are equivalent. Yet, the Examiner's Answer asserts, without explanation, that one seeking improved "vibration damping" and "stiffness" would base their selection on a different property -

material "strength". This argument illogically ignores all differences between properties of "vibration damping," "stiffness" and "strength".

Furthermore, the Examiner's proposed combination is against the teachings of Eom. A prior art reference must be considered as a whole, including portions that tend to lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983, cert denied, 469 U.S. 851 (1984)). Eom does not suggest that the horseshoe needs greater strength. On the contrary, Eom teaches the substitution of a metal horseshoe with an Al-Mg alloy in order to develop a lighter, more ductile, shock absorptive, and abrasion resistant horseshoe. Nothing in Eom suggests that the metal alloy described therein is intended to make the horseshoe stronger. On the contrary, Eom teaches to make the horseshoe softer. Clearly, one skilled in the art would not look to Weaver to strengthen the horseshoe of Eom when Eom is proposing an alloy that makes the metal softer not stronger.

Looking to the teachings of Weaver to provide a horseshoe with improved properties of "vibration damping" and "stiffness" can only be based on the teachings of the Applicant. The Examiner contends that she did not rely on information that was "gleaned only from the applicant's disclosure." However, the only description of a metal matrix composite as claimed in Claim 1 with improved "vibration damping" and "stiffness" is found in the Applicant's own specification. Such teachings are not found in either Eom or Weaver. Indeed, the Examiner concedes that no such teaching is found in Weaver. (Examiner's Answer, pg. 6, lines 21, 22). Combining Eom and Weaver does not somehow produce teachings that are not found in either reference individually.

Examiner's Inherency Argument

The Applicant has explained that at the time the invention was made the performance of the metal matrix composite horseshoe was surprising. The performance was surprising because the "vibration damping" characteristic of the metal matrix composite was unknown at the time of Eom and Weaver. (Weaver Decl. ¶¶ 4-9, 13-19). The "vibration damping" property was discovered by the Applicant at a later time. (Appeal Brief, pp. 17, 18; Weaver Decl. ¶¶ 9, 14, 15, 16, 17). In reply, the Examiner speculates that the stiffness characteristic must have been expected because it is inherent in the metal matrix material. (Examiner's Answer, pg. 5, lines 13, 14).

The knowledge in the prior art at the time the invention was made does not support the Examiner's conclusion that it would be obvious to combine Weaver with Eom to arrive at a horseshoe that provides better stiffness and vibration damping. Obviousness cannot be predicated on what is not known at the time an invention is made, even if the inherency of a certain feature is later established. *In re Rijckaert*, 9 F.3d 1531 (Fed. Cir. 1993). In the subject application, the vibration damping property of the metal matrix composite was unknown and could not have been reliably predicted. (Weaver Decl. ¶¶ 9-16). The only way of ascertaining the vibration damping property was by experimentation. (Weaver Decl. ¶¶ 14, 15, 16). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re. Mills*, 916 F.2d 680 (Fed. Cir. 1990). The Examiner offers no explanation as to why anyone skilled in the art would attempt to substitute Weaver when it was not known at the time that the material described in Weaver afforded greater vibration damping. Instead, the Examiner presumes that

the "vibration damping" should have been anticipated. However, this is contrary to the facts of record which show that the vibration was not known and that one normally skilled in the art could not properly assume its existence. (Weaver Decl. ¶¶ 8-16).

Ultimately, the Examiner's contention seems to be that one skilled in the art would be expected to randomly substitute various materials into Eom until the desired result was achieved – whether or not such materials were known to have high vibration damping. This "obvious to try" approach has been rejected by the Federal Circuit. *Ecolochem, Inc. v. Southern California Edison Co.*, 227 F.3d 1361 (Fed. Cir. 2000) reh'g denied, in banc suggestion declined, (December 13, 2000) and cert. denied, 121 S. Ct. 1607 (2001).

The Examiner's inherency argument completely avoids the point at issue. The issue for decision is: "Would the Eom/Weaver combination that the Examiner proposes make the claimed invention obvious to one normally skilled in the art? "Vibration damping" and "stiffness" properties are required by the horseshoe of Claim 1. Weaver does not teach that the metal matrix composite was known to have improved stiffness and vibration damping. (Examiner's Answer, pg. 6, lines 21, 22, Weaver Decl. ¶¶ 11-14). Therefore, there is no teaching or suggestion to combine Weaver and Eom. Without such teaching or suggestion, the proposed combination is improper. Essentially, the Examiner's contention supposes that one seeking a horseshoe with improved "vibration damping" and "stiffness" would accomplish that result by substituting materials that were not known to have those properties or to produce that result. Such an absurd proposition does not make the claimed invention unpatentable.

At the time that the invention was made, there must be some reason known in the art for making the substitution based on the suitability of that material. In *re Rijckaert, supra*. The

claimed invention requires that the material have a "vibration damping" property. Prior to the time of the invention, it was not known that the material that is described in Weaver had the property of "vibration damping". (Weaver Decl, ¶¶ 14-17). Since this was not known in the art, it would not have been obvious for one skilled in the art to select the metal matrix composite of Weaver for use in the claimed horseshoe.

Examiner's New Combination of Eom and Weaver (Disclaimed in Final Office Action)

In the Examiner's Answer, the Examiner may be suggesting a combination of Eom and Weaver that the Examiner expressly disavowed in the Final Office Action.⁵ The Final Official Action states "the [E]xaminer is not trying to replace the metal of Eom with the metal composition as taught by [the '607 Patent]."⁶ "The [E]xaminer is not replacing the already known aluminum."⁷

In what may be an assertion of the combination that was expressly denied in the Final Official Action, the Examiner now may be substituting the metal alloy of Eom with the metal matrix composite of Weaver. (Examiner's Answer, pg. 4, lines 14-20). The Examiner declares that it would have been an obvious design choice to substitute the metal matrix composite of Weaver on the basis of its suitability for the intended use.

This argument also fails. It would not have been obvious to combine Eom and Weaver to secure a horseshoe with improved vibration damping and stiffness because Eom and Weaver do not describe vibration damping and stiffness as selection criteria for horseshoes. Furthermore,

⁵ Official Action dated November 21, 2003.

⁶ Final Office Action, pg. 5, lines 16, 17.

⁷ Final Office Action, pg. 6, lines 16-18.

the materials in Eom and Weaver are not described as having stiffness and vibration damping. The only teaching that would suggest the use of the metal matrix composite is the Applicant's own teachings. However, those are not available to support the Examiner's obviousness theory.

Miscellaneous Comments in Examiner's Answer

The Examiner seems to contend that the Applicant never offered a technical explanation as to how the metal matrix material affords greater stiffness and, therefore, that result cannot be considered unexpected. (Examiner's Answer, pg. 5, lines 15-17). No authority is cited for this novel proposition. This notion stands the whole concept of inventiveness on its head and is clearly not the law. A newly identified property of a material that was previously unknown does not somehow become expected unless the property can be explained. Indeed, the novelty of many inventions is underscored by the fact that they cannot be explained.

Also, the Examiner urges that replacing Eom's metal alloy with Weaver's metal matrix composite does not change the performance of Eom's horseshoe. (Examiner's Answer, pg. 6, lines 1-4). This appears to argue against a motivation for making the combination at all and contends that even if the combination were made, it would not produce the claimed result! This amounts to nothing more than further evidence of the Examiner's failure to understand the meaning of "metal matrix composite."

Conclusion

The Examiner's Answer concedes that the Examiner draws no distinction between metal matrix composites and metal alloys. While the Examiner makes no such distinction, the

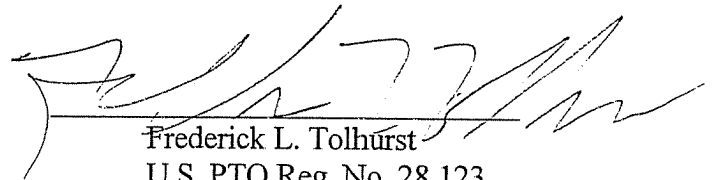
differences are well known to those skilled in the art. The record of this application amply demonstrates this fact. The Official Action cannot properly support a rejection of the claims that is based essentially on a refusal to acknowledge knowledge in the art that has been specifically documented in this record.

Accordingly, allowance of Claims 1-16 is respectfully requested.

The Commissioner is hereby authorized to charge Deposit Account No. 03-2026 for any fees associated with this Reply Brief.

Respectfully submitted,

By:

A handwritten signature in black ink, appearing to read 'F. L. Tolhurst', written over a horizontal line.

Frederick L. Tolhurst
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912967_1

Exhibit B

Applicant's Reply Brief dated June 6, 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Samuel C. Weaver)	
)	
Serial No. 09/838,866)	METAL MATRIX
)	COMPOSITE HORSESHOE
)	
Filed: April 20, 2001)	
)	
Art Unit: 3643)	
)	
Patent Examiner: Nguyen, Son T.)	
)	
Our Ref: 01-211)	
)	
Customer No. 30058)	
)	

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

June 6, 2005

APPLICANT'S REPLY BRIEF TO EXAMINER'S ANSWER DATED APRIL 5, 2005

This appeal is to decide whether, considering Eom¹ in view of Weaver '607², the invention of Claims 1-16 was obvious to one of ordinary skill in the art at the time that the invention was made.

The claimed invention is a “horseshoe” that has “improved vibration damping and stiffness”. The horseshoe is made of a composition that is selected from the field of “metal matrix composites”. The selected metal matrix composite is composed of a metal selected from the group of aluminum, magnesium, titanium and mixtures thereof and silicon boride selected from the group of silicon hexaboride and silicon tetraboride and mixtures thereof. (Appl. Pg. 2,

¹ U.S. Patent No. 5,344,607 to Eom et al.

² U.S. Patent No. 5,573,607 to Weaver.

lines 4-7, 13 and 14; and Weaver (incorporated by reference, pg. 2, lines 14, 15) Col. 1, lines 10-14; Col. 2, lines 1-6; Col. 2, lines 24-25; Col. 2, lines 53-56; Col. 2, line 65 – Col. 3, line 3; Col. 3, lines 14-18).

The Examiner must show, by a preponderance of the evidence of record, that it is more probable than not that the claimed invention is unpatentably obvious over Eom in view of Weaver '607. *In re Eli Lilly & Co.*, 902 F.2d 943 (Fed. Cir. 1990); *In re Oetiker*, 977 F.2d 1443 (Fed. Cir. 1992). The Examiner's Answer dated April 5, 2005 merely reaffirms that the Examiner's positions are contrary to the facts of record in this appeal and that the claimed invention is patentable over Eom in view of Weaver '607.

Examiner's Answer Dated April 5, 2005

The Examiner's Answer dated April 5, 2005 (herein "Ex. Ans. II") repeats and re-alleges the same contentions as the Examiner's Answer dated October 7, 2004 (herein "Ex. Ans. I"). The Applicant previously responded to Ex. Ans. I in Applicant's Reply Brief dated November 12, 2004, a copy of which is appended hereto as Exhibit A. Accordingly, Applicant hereby incorporates by reference Applicant's Reply Brief dated November 12, 2004 and repeats and re-alleges all of the statements and arguments thereof as if fully set forth herein.

In addition, Applicant further states herein that Ex. Ans. II confirms that the rejection of the claims is grounded in fundamental error with no support anywhere in the record on appeal.

Additional Remarks

Ex. Ans. II is built on a misconception of the plain meaning of the words that describe and claim the Applicant's invention. In the claims and throughout the specification, the Applicant describes the invention as a "horseshoe" that is made from a "metal matrix composite". Ex. Ans. II argues that Eom discloses "a metal alloy selected from aluminum, magnesium and titanium and mixtures thereof" and that such composition is a "metal matrix composite" as described in the subject application. It is not. Eom teaches a metal alloy, not a metal matrix composite. As essential as it may be to the Examiner's argument, "metal alloys" are not "metal matrix composites".

The record clearly establishes that those of ordinary skill in the art knew a "metal matrix composite" to be a metallic matrix in combination with a physical reinforcing constituent. In contrast, in metal alloys, the alloy's atoms combine with the parent metal's crystal lattice. Weaver II Decl. ¶¶ 8-18³, Response to Official Action, pp. 2, 3⁴, Introduction to Metal Matrix Composites⁵, The Structure of Metal, pp. 1-3⁶, and Appeal Brief dated November 12, 2004, p. 8. Thus, those skilled in the art distinguish "metal alloys" wherein the alloy and the parent metal combine at the atomic level from "metal matrix composites" wherein a reinforcing constituent does not combine with the metal matrix at the atomic level.

³ Declaration of Samuel C. Weaver dated August 21, 2003 (herein cited as "Weaver II Decl. ").

⁴ Applicant's Response to Official Action dated August 22, 2003.

⁵ "An Introduction to Metal Matrix Composites," T.W. Clyne and P.J. Withers, pp. 1-70, Cambridge University Press, 1993.

⁶ "The Structure of Metal," Bob Capudean, The Fabricator.com, April 24, 2003.

Ex. Ans. II does not even contend that Eom discloses a “metal matrix composite”! Ex. Ans. II admits that it merely uses "metal alloy" interchangeably with "metal matrix composite"! (Ex. Ans. II, pg. 3, lines 8-13). The Examiner offers only conjecture that, contrary to the record, "metal matrix composites" are the same as "metal alloys". Nothing in the application or any of the references suggests such an equivalency. On the contrary, the file history clearly demonstrates that those terms have very different meanings and are not interchangeable!

In an attempt to redefine "metal matrix composite", the Examiner asserts that the meaning of “metal matrix composite” is “unclear”. Purporting to rely on the specification, the Examiner then “finds that the definition of a metal matrix composite is simply a material that is formed by a molten metal selected from aluminum, magnesium, titanium and mixtures thereof.” (Ex. Ans. II, pg. 3, line 22 – pg. 4, line 4). The Examiner offers no explanation as to how the meaning of "metal matrix composite" is "unclear". On the contrary, Ex. Ans. II admits that the specification defines "metal matrix composite" as "molten metal selected from the group consisting of aluminum, magnesium, titanium and mixtures thereof.... Then silicon boride is added to create this metal matrix composite horseshoe...." (Ex. Ans. II, pg. 3, lines 16-19). Similarly, the Examiner offers no clues as to the language of the specification on which she relies to support the critical "finding" that a metal matrix composite is "simply a material that is formed by a molten metal selected from aluminum, magnesium, titanium and mixtures thereof". It is certainly not found in Claim 1 or on pages 2 or 3 of the specification! There, the specification clearly explains that the selected metal matrix composite is composed of a metal selected from the group of aluminum, magnesium, titanium and mixtures thereof and silicon boride selected from the group of silicon hexaboride and silicon tetraboride and mixtures thereof.

Ex. Ans. II concedes that the metal alloy of Eom does not have silicon boride! The Examiner still insists that, somehow, it would be obvious to modify the metal alloy of Eom in light of the metal matrix composite that is taught in Weaver '607 to arrive at a metal alloy. However, Ex. Ans. II does not explain how that combination is expected to transform Eom into a metal matrix composite.

Even if Eom were to be transformed into a metal matrix composite, there is nothing in either Eom or Weaver '607 to suggest their combination. The Examiner refers to a teaching in Weaver '607 that metal matrix composites are "stronger" than the counterpart pure metals. (Weaver '607, Col. 1, lines 8-14; Ex. Ans. II, pg. 4, lines 7-9). However, the claimed horseshoe does not specify material "strength". It requires "improved vibration damping and stiffness". Nothing in the subject application or any of the references equates material "strength" with "vibration damping and stiffness". Those properties are not the same. Accordingly, a teaching in Weaver '607 as to material "strength" offers no support for the Examiner's contention that the cited references would cause one skilled in the art to combine Eom and Weaver '607 to improve "vibration damping and stiffness". Weaver I Decl. ¶¶ 13-18.⁷

Ex. Ans. II also attempts to create obviousness by confusing ductility with stiffness. Ex. Ans. II extrapolates a statement in Eom that the horseshoe should have "ductility so that its shape may be changed a little to correctly fit on the horsehoof" into a teaching that the horseshoe will also have stiffness. Ex. Ans. II, pg. 6, lines 4-7. However, this is nothing more than the Examiner's own creation and is not supported by any teaching of Eom. The Examiner's

⁷ Declaration of Samuel C. Weaver dated January 13, 2003 (herein cited as Weaver I Decl.).

mischaracterization of Eom cannot change the fact that Eom has no teaching that the horseshoe requires both "stiffness" and "vibration damping" as required by the subject claims.

Apparently conceding the weakness of its primary argument, Ex. Ans. II also contends that it would be obvious for one skilled in the art to make a wholesale substitution of the metal matrix composite of Weaver '607 for the metal alloy of Eom. The only support for making that substitution is a pretense that this would be merely a matter of obvious choice. (Ex. Ans. II, pg. 4, lines 14-20) Ex. Ans. II offers no reasoning to support that conclusion.

According to the facts of record, at the time that the invention was made it was not a matter of obvious design choice to make such a wholesale substitution. The claims require a "horseshoe" that has "improved vibration damping and stiffness". The record of this application is that those skilled in the art would not recognize the parameter of "vibration damping and stiffness" as being found in the metal matrix composite of Weaver '607. Weaver I Decl. ¶¶ 13-18; and Weaver II Decl. ¶¶ 11-15, 19. That fact is uncontroverted. The "vibration damping and stiffness" in the composite described in Weaver '607 was unknown to those skilled in the art. Weaver I Decl. ¶¶ 9, 11, 13-16, 18 and 19; and Weaver II Decl. ¶¶ 9, 11, 15 and 19. It was surprising to the inventor of Weaver '607 when he later discovered this property! (Weaver I Decl. ¶¶ 13-19; and Weaver II Decl. ¶¶ 11-19). Accordingly, it cannot be properly said that combining the Eom and Weaver '607 references to achieve a result that was not known from either reference would be obvious.

Next, the Examiner argues that the properties of "stiffness" and "vibration damping" were not unexpected because they were inherent in Weaver '607. Ex. Ans. II, pg. 5, lines 4-6. The Examiner quarrels that merely because Weaver '607 does not teach that the metal matrix

composite has both stiffness and vibration damping, that does not mean that it does not exist in the material. This argument is inapposite and completely misses the point of the claimed invention. The constancy of material properties is not the issue for decision and is not a proper basis for denying patentability of the subject claims. The reason for rejection and the sole issue for decision is whether the claimed invention, a horseshoe, is obvious in light of Eom and Weaver '607 as known at the time that the invention was made.

The issue is: "Given the knowledge at the time of the invention, would it have been obvious for one skilled in the art to have made the various combinations that the Examiner now proposes? The answer is "no" because the material in Weaver '607 was not known to have the "stiffness" and "vibration damping". (Weaver I Decl. ¶¶ 15-19; and Weaver II Decl. ¶¶ 15-18). It is beyond cavil that Weaver '607 does not teach both stiffness and vibration damping and that those parameters were not known to those skilled in the art at the time of the invention. The declaration of the inventor of Weaver '607 so states. (Weaver I Decl. ¶ 18; and Weaver II Decl. ¶ 18). Under those circumstances, how could it have been obvious for one to use the material in Weaver '607 to make a combination with Eom that was intended to result in a horseshoe having "stiffness" and "vibration damping"? The answer, of course, is that it was not obvious.

According to the Examiner's argument, Edison's light bulb was unpatentably obvious because the filament had the same properties before and after Edison's invention. However, Edison did not invent the filament material - he invented the light bulb. The test for obviousness was: "When the critical properties of the filament are unknown, would it have been obvious for one skilled in the art to select that material as a filament?"

Similarly, the question here is: "Would one have obviously selected the material described in Weaver '607 to make a "horseshoe" having "improved vibration damping and stiffness" without knowing that the material itself afforded "improved vibration damping and stiffness"? Of course such a selection was not obvious and the Examiner's proposed combination is argued to be obvious only in hindsight of the Applicant's own teachings. Ex. Ans. II offers no precedent or authoritative support for any theory by which it somehow becomes obvious to combine references by relying on properties of a material that are not known to exist prior to the time of the purported combination.

The sum of the Examiner's contentions seems to be that since Eom teaches making horseshoes of metal and Weaver '607 teaches replacing certain metals with metal matrix composites, it somehow becomes obvious to substitute the metal matrix composite of Weaver '607 for any metal alloy – no matter what application is made of the metal and notwithstanding that the properties that are desired in the ultimate product are unknown in the metal matrix composite. In fact, Ex. Ans. II does not purport that the combination would achieve "improved vibration damping and stiffness". According to the Examiner, the combination would "not change the performance of Eom's horseshoe". (Ex. Ans. II, page 6, lines 1-7). However, in that case there is no motivation for one skilled in the art to attempt the Examiner's combination of Eom with Weaver '607. The Examiner's argument also suffers from the further difficulty that neither Eom nor Weaver '607 describe or suggest that the combination would produce a horseshoe with "improved vibration damping and stiffness". That distinction is only learned from the subject application.

The Examiner concedes that she is relying on hindsight reasoning. Ex. Ans. II, pg. 6, lines 10-13. But, she quarrels that her reasoning “takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made”. Ex Ans. II, pg. 6, lines 13-16. However, the contention that one skilled in the art was aware that the Weaver ‘607 metal matrix composite exhibited both "stiffness" and "vibration damping" is not supported by Weaver '607, Eom or any other document in the application on appeal. To the contrary, the Weaver Declarations state exactly the opposite! The Weaver Declarations state that it was not known that the Weaver ‘607 metal matrix composite exhibited both stiffness and vibration damping! (Weaver I Decl. ¶¶ 8, 9, 11, 15-18; and Weaver II Decl. ¶¶ 9, 11, 14-19.) The Examiner does not cite any reference for that information because that information is found only in the Applicant’s disclosure.

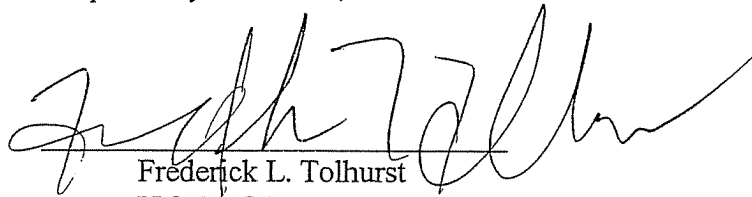
Conclusion

Ex. Ans. II concedes that the Examiner draws no distinction between metal matrix composites and metal alloys. Although the Examiner makes no such distinction, the differences are well known to those skilled in the art. The record of this application amply demonstrates this fact. The rejection of the claims is improper because it is based on combining a refusal to acknowledge distinctions in the art that have been specifically documented in the record with knowledge that is found only in the Applicant's own teachings. Accordingly, allowance of Claims 1-16 is respectfully requested.

The Commissioner is hereby authorized to charge Deposit Account No. 03-2026 for any fees associated with this Reply Brief.

Respectfully submitted,

By:

A handwritten signature in black ink, appearing to read 'Frederick L. Tolhurst', written over a horizontal line.

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974503_1

Exhibit C

Declaration of Samuel C. Weaver dated August 21, 2003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Samuel C. Weaver)	
)	METAL MATRIX
Serial No. 09/838,866)	COMPOSITE HORSESHOE
)	
Filed: April 20, 2001)	
)	
Art Unit: 3643)	
)	
Patent Examiner: Nguyen, Son T.)	
)	
Our Ref: 01-211)	
_____)	

Assistant Commissioner for Patents
Washington, DC 20231

August 21, 2003

DECLARATION OF SAMUEL C. WEAVER

NOW COMES Samuel C. Weaver, the inventor in the above-captioned application, who declares that the following facts are true, complete and correct:

1. For the last 38 years, I have worked in various metal-related fields including fields relating to metal matrix composites and ceramic composites. Prior to that time, I earned the following degrees: Bachelor of Science in Metallurgical Engineering from University of Missouri at Rolla; Master of Science in Metallurgical Engineering from the University of Tennessee; and Ph.D. in Metallurgical Engineering from the University of Tennessee.
2. I have founded two companies that developed metal materials and metal matrix composites as well as a number of commercial products that are manufactured from those materials.

3. I am the inventor in the above-captioned application U.S. Application Serial No. 09/838,866 (herein “the ‘866 Application”). I am also an inventor in U.S. Patent Nos. 5,587,241, 5,573,985, 5,573,607, 5,077,246, 4,906,324, 4,873,069.
4. One of the patents of which I am an inventor, U.S. Patent No. 5,573,607 (herein “the ‘607 Patent”), was cited in an Information Disclosure Statement that was filed April 20, 2001 with respect to the ‘866 Application. The ‘607 Patent was thereafter cited by the Patent and Trademark Office in the prosecution of the ‘866 Application as the primary reference in Official Actions dated February 26, 2002 and May 15, 2002. The ‘607 Patent has been assigned to the same assignee as the ‘866 Application.
5. In the past, certain horseshoes were made of materials that were both lightweight in comparison to conventional ferrous-material horseshoes and long wearing in comparison to some known lightweight metal alloys (such as aluminum alloys) that have been used to construct horseshoes. Examples of such materials are aluminum alloys such as described in U.S. Patent 5,344,608 (herein “Eom”) which has been cited and applied in the ‘866 Application.
6. The ‘866 Application discloses a horseshoe that also is lightweight in comparison to conventional ferrous-material horseshoes and long wearing in comparison to some known lightweight metal alloys (such as aluminum alloys) that have been used to construct horseshoes.
7. In addition to the lightweight and long wearing properties of metal alloy horseshoes, the ‘866 Application discloses a horseshoe that also provides a cushioning property resulting from vibration damping.
8. Aluminum alloys such as described in Eom belong to the group of metal alloys. Such materials generally do not have a vibration damping property such as afforded by the metal matrix composite of the ‘607 Patent.

9. At the time of the invention of the '866 Application, it was known that the metal matrix composite described in the '607 Patent afforded advantages for certain applications in which aluminum, magnesium or titanium metals are used. However, the metal matrix composite of the '607 Patent was not known to be a universal substitute for all uses of those metals. Moreover, at the time that the '607 Patent issued, it was not known that the metal matrix composite described in the '607 Patent had relatively high cushioning.
10. Eom describes an aluminum alloy. An alloy is a mixture of two or more metals.
11. The '607 Patent describes a metal matrix composite that is comprised of aluminum, magnesium or titanium and alloys thereof containing silicon-boride particles. A metal matrix composite is not pure metal and is not a metal alloy. The metal matrix composite that is disclosed in the '607 Patent is not a metal alloy and is not a universal substitute for metal alloys. The metal matrix composite of the '607 Patent has certain properties that are substantially different than those of metal alloys.
12. I have carefully reviewed the Eom Patent but have found nothing therein that would lead one normally skilled in the art to substitute a metal matrix composite for the aluminum alloy that is taught by the Eom Patent.
13. The '607 Patent states that "some" drawbacks of aluminum, magnesium and titanium metals have been overcome through the use of metal matrix composites of those metals. However, this does not mean that metal matrix composites are appropriate for use in every application for which a metal could be used. For reasons of material strength and other properties, there are some applications for which substitution of metal matrix composites are not suitable.
14. Nothing in '607 Patent describes the metal matrix composite to have a high cushioning property. One normally skilled in the art could not assume that metal matrix composite described in the '607 Patent would exhibit a high cushioning or vibration damping property. Some metal matrix composites do not exhibit a high vibration damping property.
15. Vibration damping in the metal matrix composite described in the '607 Patent was

not known at the time that I made that invention or even at the time that the '607 Patent issued. Several years after the '607 Patent issued, an aluminum matrix composite composed of silicon borides and aluminum was tested under my direction for vibration damping. The vibration damping tests used a transient response method to measure damping behavior. The test was conducted to determine the suitability of the aluminum matrix composite for use in computer memory discs. The test results determined that vibration damping in the aluminum matrix composite was 4.25 times greater than vibration damping in aluminum. Prior to that time, the degree of vibration damping of the aluminum matrix composite was unknown.

16. Based on my education and experience in the field of metallurgy, prior to the time of the above-mentioned tests, the vibration damping property of the aluminum matrix composite was unknown and the relatively high vibration damping of that metal matrix composite was unexpected. Except for testing such as I had performed on the aluminum matrix composite, I am currently unaware of another manner in which the vibration damping properties of a particular metal matrix composite can reliably be predicted.
17. The test results described in Paragraph 15 above show that metal matrix composite horseshoes as further described in the '866 Application have an improved vibration damping property.
18. Based on my education and experience, I conclude that it would not be obvious for one normally skilled in the art to select the metal matrix composite of the '607 Patent for the manufacture of horseshoes having a vibration damping coefficient that was high relative to the damping coefficient of prior art materials that are lightweight and also have high stiffness.
19. I am familiar with the level of education, experience and skill of one normally skilled in the relevant art. The teachings of the '607 Patent would not lead one normally skilled in the art to expect high vibration damping in a horseshoe made

of the metal matrix composite nor would any teaching of the '607 Patent lead one normally skilled in the art to substitute the metal matrix composite of the '607 Patent for the aluminum alloy described in Eom Patent.

20. At the time that the invention of the '866 Application was made, the teaching of the '607 Patent would not have motivated one normally skilled in the art to attempt to use a metal matrix composite as described therein to produce a horseshoe having high vibration damping because the '607 Patent does not describe the metal matrix composite to have a high vibration damping property and I am aware of no manner by which to reliably predict the level of vibration damping based on the disclosure of the '607 Patent.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Further I say not.

A handwritten signature in cursive script, appearing to read "Samuel C. Jones", is written over a horizontal line.

Exhibit D

Declaration of Samuel C. Weaver dated January 13, 2003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Samuel C. Weaver)	
)	METAL MATRIX
Serial No. 09/838,866)	COMPOSITE HORSESHOE
)	
Filed: April 20, 2001)	
)	
Art Unit: 3643)	
)	
Patent Examiner: Nguyen, Son T.)	
)	
Our Ref: 01-211)	
_____)	

Assistant Commissioner for Patents
Washington, DC 20231

January 13, 2003

DECLARATION OF SAMUEL C. WEAVER

NOW COMES Samuel C. Weaver, the inventor in the above-captioned application, who declares that the following facts are true, complete and correct:

1. For the last 38 years, I have worked in various metal-related fields including fields relating to metal matrix composites and ceramic composites. Prior to that time, I earned the following degrees: Bachelor of Science in Metallurgical Engineering from University of Missouri at Rolla; Master of Science in Metallurgical Engineering from the University of Tennessee; and Ph.D. in Metallurgical Engineering from the University of Tennessee.
2. I have founded two companies that developed metal materials and metal matrix composites as well as a number of commercial products that are manufactured from those materials.

3. I am the inventor in the above-captioned application U.S. Application Serial No. 09/838,866 (herein “the ‘866 Application”). I am also an inventor in U.S. Patent Nos. 5,587,241, 5,573,985, 5,573,607, 5,077,246, 4,906,324, 4,873,069.
4. One of the patents of which I am an inventor, U.S. Patent No. 5,573,607 (herein “the ‘607 Patent”), was cited in an Information Disclosure Statement that was filed April 20, 2001 with respect to the ‘866 Application. The ‘607 Patent was thereafter cited by the Patent and Trademark Office in the prosecution of the ‘866 Application as the primary reference in Official Actions dated February 26, 2002 and May 15, 2002. The ‘607 Patent has been assigned to the same assignee as the ‘866 Application.
5. In the past, certain horseshoes were made of materials that were both lightweight in comparison to conventional ferrous-material horseshoes and long wearing in comparison to some known lightweight metal alloys (such as aluminum alloys) that have been used to construct horseshoes. Examples of such materials are aluminum alloys such as described in Japanese Patent No. 407076749A (herein “Eiko ‘749”) which has been cited and applied in the ‘866 Application.
6. The ‘866 Application discloses a horseshoe that also is lightweight in comparison to conventional ferrous-material horseshoes and long wearing in comparison to some known lightweight metal alloys (such as aluminum alloys) that have been used to construct horseshoes.
7. In addition to the lightweight and long wearing properties of metal alloy horseshoes, the ‘866 Application discloses a horseshoe that also provides a cushioning property resulting from vibration damping.
8. Aluminum alloys such as described in Eiko ‘749 belong to the group of metal alloys. Such materials generally do not have a vibration damping property such as afforded by the metal matrix composite of the ‘607 Patent.

9. At the time of the invention of the '866 Application, it was known that the metal matrix composite described in the '607 Patent afforded advantages for certain applications in which aluminum, magnesium or titanium metals are used. However, the metal matrix composite of the '607 Patent was not known to be a universal substitute for all uses of those metals. Moreover, at the time that the '607 Patent issued, it was not known that the metal matrix composite described in the '607 Patent had relatively high cushioning.
10. Eiko '749 describes an aluminum alloy. An alloy is a mixture of two or more metals.
11. The '607 Patent describes a metal matrix composite that is comprised of aluminum, magnesium or titanium and alloys thereof containing silicon-boride particles. A metal matrix composite is not pure metal and is not a metal alloy. The metal matrix composite that is disclosed in the '607 Patent is not a metal alloy and is not a universal substitute for metal alloys. The metal matrix composite of the '607 Patent has certain properties that are substantially different than those of metal alloys.
12. I have carefully reviewed the Eiko '749 Patent but have found nothing therein that would lead one normally skilled in the art to substitute a metal matrix composite for the aluminum alloy that is taught by the Eiko '749 Patent.
13. The '607 Patent states that "some" drawbacks of aluminum, magnesium and titanium metals have been overcome through the use of metal matrix composites of those metals. However, this does not mean that metal matrix composites are appropriate for use in every application for which a metal could be used. For reasons of material strength and other properties, there are some applications for which substitution of metal matrix composites are not suitable.
14. Nothing in '607 Patent describes the metal matrix composite to have a high cushioning property. One normally skilled in the art could not assume that metal matrix composite described in the '607 Patent would exhibit a high cushioning or vibration damping property. Some metal matrix composites do not exhibit a high vibration damping property.

15. Vibration damping in the metal matrix composite described in the '607 Patent was not known at the time that I made that invention or even at the time that the '607 Patent issued. Several years after the '607 Patent issued, an aluminum matrix composite composed of silicon borides and aluminum was tested under my direction for vibration damping. The vibration damping tests used a transient response method to measure damping behavior. The test was conducted to determine the suitability of the aluminum matrix composite for use in computer memory discs. The test results determined that vibration damping in the aluminum matrix composite was 4.25 times greater than vibration damping in aluminum. Prior to that time, the degree of vibration damping of the aluminum matrix composite was unknown.
16. Based on my education and experience in the field of metallurgy, prior to the time of the above-mentioned tests, the vibration damping property of the aluminum matrix composite was unknown and the relatively high vibration damping of that metal matrix composite was unexpected. Except for testing such as I had performed on the aluminum matrix composite, I am currently unaware of another manner in which the vibration damping properties of a particular metal matrix composite can reliably be predicted.
17. The test results described in Paragraph 15 above show that metal matrix composite horseshoes as further described in the '866 Application have an improved vibration damping property.
18. Based on my education and experience, I conclude that it would not be obvious for one normally skilled in the art to select the metal matrix composite of the '607 Patent for the manufacture of horseshoes having a vibration damping coefficient that was high relative to the damping coefficient of prior art materials that are lightweight and also have high stiffness.
19. I am familiar with the level of education, experience and skill of one normally skilled in the relevant art. The teachings of the '607 Patent would not lead one normally skilled in the art to expect high vibration damping in a horseshoe made

of the metal matrix composite nor would any teaching of the '607 Patent lead one normally skilled in the art to substitute the metal matrix composite of the '607 Patent for the aluminum alloy described in Eiko '749 Patent.

20. At the time that the invention of the '866 Application was made, the teaching of the '607 Patent would not have motivated one normally skilled in the art to attempt to use a metal matrix composite as described therein to produce a horseshoe having high vibration damping because the '607 Patent does not describe the metal matrix composite to have a high vibration damping property and I am aware of no manner by which to reliably predict the level of vibration damping based on the disclosure of the '607 Patent.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Further I say not.

